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# A Team-based Information Management Framework

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## 1.0 Introduction

An Information Abstraction Framework (IAF) has been proposed by Becker and Gibson (1995) to support information management within an organization. The IAF as shown in Figure 1 is comprised of three levels of information abstraction: *technical*, *project management*, and *organization*. The concentric rings in the IAF can be viewed as a representation of the process boundaries associated with the three organizational levels.

In a team-based environment, the central ring represents the technical aspects of project development in terms of processes and practices. The information requirements at this level include resource data (i.e., team composition, skills, training requirements) plans, progress reports, review and test documents, deliverables, and other data associated with a team assignment.

The Project Management ring represents information abstracted from the technical level in order to maintain intellectual control during project development. Team generated information is abstracted to produce project-based plans, progress reports including quality, productivity, and resource utilization, schedules, and project deliverables, among others.

The Organization layer represents information abstracted from the Project Management layer to provide information on organizational maturity as defined by SEI's Capability Maturity Model (CMM) (Paulk, 1989). Project information is used to plan, track, and assess the organization's capabilities in developing high-quality software systems.

The IAF has been developed to support an organizational infrastructure that views its information requirements as expanding beyond the boundary of software development. Humphrey (1989) specifies project management as a key requirement for having a software development organization move from its initial (chaotic) stage toward a higher-level of maturity. What is needed to sustain and improve organizational maturity is effective information management at all three levels in the IAF.

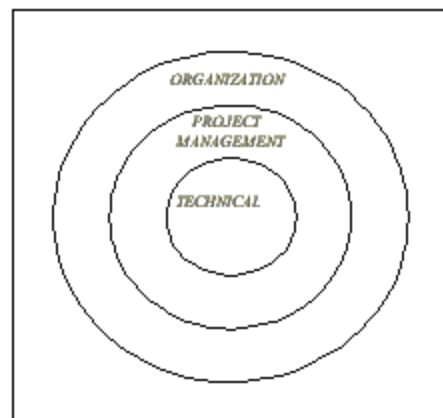


Figure 1: The Three Layers in the IAF

The emphasis of this paper is on the information requirements associated with teamwork. In the pursuit of higher-levels of maturity, many organizations are implementing team-based environments for successful project development. The basis of this work is the Team Assignment Model that has been used successfully in industry to support the development of complex systems (Becker et al., 1996). The Team Assignment approach decomposes a project into well-defined team assignments.

## 2.0 Team-Based Information Requirements

Figure 2 shows team-based information flow within the three layers of the IAF. In order to support this transparent flow of team-related information, information requirements must be identified at each of the three levels. At the technical level, the information requirements typically include the following:

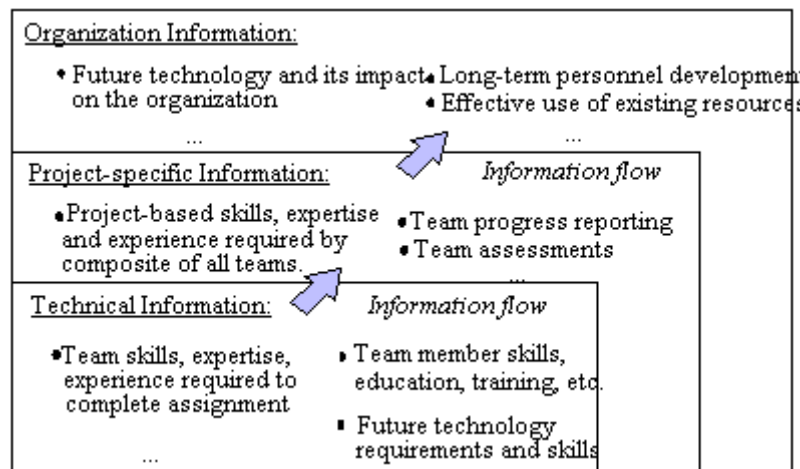


Figure 2: Team-Based Information Flow

### Planning Information

- Team Assignments - the scope and duration of the team assignments that make up the project.
- Team Membership - skills, experience, education, and background needed to successfully complete the team assignment.
- Team Training - team skills that are lacking which negatively impact the completion of the project.

### Tracking Information

- Team Assignment Plan - the actual plan developed by a team to successfully complete its assignment.
- Team Progress Report - ongoing team reporting on schedule commitments, performance, quality, etc.
- Team Reviews - the results of team reviews in terms of defects, number of follow-up reviews, and final sign-offs on deliverables.
- Team Leadership/Membership - roles and responsibilities of team members including leader, moderator, reporter, and other defined roles.
- Team Integration - relationship of the team with other teams and projects.

### Assessment Information

- Team Performance - team plan and actual completion of tasks and deliverables.
- Team Commitment - the level at which teams quality and productivity objectives have been met.

- Team Participation - team member's sense of belonging and willingness to share team responsibilities.

Technical information is abstracted at the Project Management level in order to provide timely information about the quality, productivity, and resource utilization associated with project teams. This information would include:

#### Planning Information

- Project - for all team assignments comprising the project -- total number of resources, timeline of resource commitment, and project skill and experience requirements.
- Project and Team Composition - estimated number of line and project management and team leaders.
- Technology Requirements - project-specific technology requirements (training needs).

#### Tracking Information

- Resources - number of teams fully staffed and trained.
- Quality - number and type of defects per assignment.
- Productivity - team's progress toward assignment completion.

#### Assessment Information

- Resource Utilization - the effective use of team member skills and expertise, effectiveness of training program and future improvements.
- Quality and Productivity Results - actual project quality and productivity data versus planned goals.

At the organization level, team-based project information is abstracted to provide ongoing feedback on the maturity of the organization. This includes risk analysis in terms of technological changes, competitiveness and other factors. The following information illustrates this concept of higher-level information abstraction:

#### Planning Information

- Personnel Development - organizational needs to remain competitive and to adapt to technological changes.
- Training Program - training program that plans for organizational growth, technology changes, and other factors.

#### Tracking Information

- Personnel Database - the organization's "knowledge-base" as a composition of individual and team competence, skill, experience, etc.

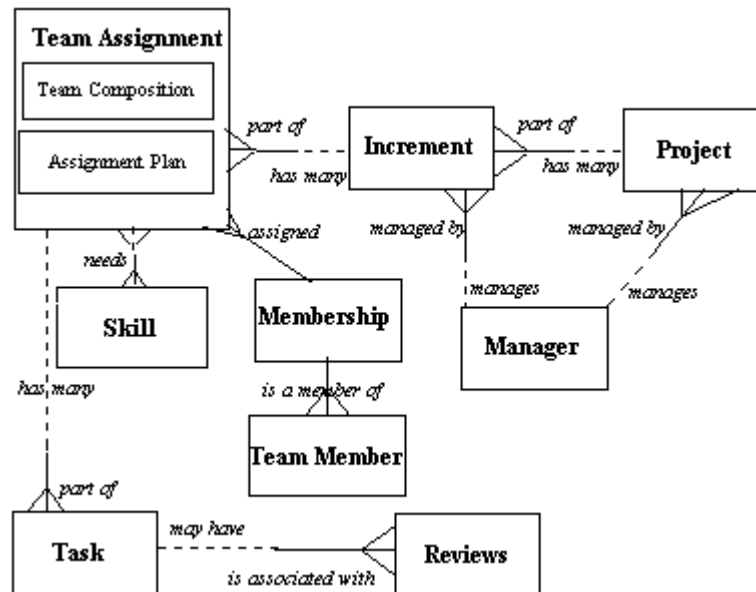


Figure 3: A Team-Based Conceptual Schema

- Quality, Productivity, and Performance - project-based information on defects, schedule commitments, and team performance.

#### Assessment Information

- Long-term Personnel Development - has the organization maintained.
- Quality, Productivity, and Performance Achievements - assessment of long-term improvements and accomplishments in terms of meeting organizational goals and commitments.

### 3.0 A Team-Based Conceptual Schema

A conceptual model that supports team-based information requirements at the technical level in the IAF is shown in Figure 3. This Entity-relationship diagram provides a powerful means of conceptualizing information requirements that can be automated via CASE (Barker, 1994). The ERD illustrates the hierarchical relationships that exist between a project and its increments; an increment and its team assignments; and an assignment and its tasks. It also includes team membership and skill requirements for the successful completion of a team assignment.

What is needed is a feasible means of maintaining and accessing team and management information at each level in the IAF. The conceptual schema would provide a basis for developing a relational database that maintains information at the technical level and that would support information abstraction at the project management and organization levels.

### 4.0 Conclusion

The Team Assignment Model provides a basis for decomposing a project into meaningful team assignments. It also identifies a process by which teams plan, track, and assess team efforts in the successful completion of their assignments. Research efforts are focused on a user interface and network structure required to support the Team Assignment Model using the IAF outlined in this paper. This automated environment would allow for easy access to management and team-based information at each level in the IAF thus sustaining a higher-level of organizational maturity. An intranet environment is being investigated for providing a distributed link to the relational database that supports the IAF.

## References

References will be made available by the first author upon request.